



November 19, 2018

Chairman Ajit V. Pai
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Dear Chairman Pai:

On behalf of Comcast Corporation, thank you for your letter of November 5 to our Chairman and Chief Executive Officer, Brian Roberts, regarding our ongoing efforts in collaboration with the Commission to mitigate illegal robocalls relying on spoofed caller ID information. As President of the Technology and Product organization within Comcast Cable, I have played a lead role in overseeing the development and implementation of measures targeting these abusive calling practices, and Mr. Roberts has asked me to provide this response to your letter.

Comcast is proud to be at the forefront of efforts to address the scourge of illegal spoofed robocalls in this country, including the development of the end-to-end call authentication protocol known as SHAKEN (Signature-based Handling of Asserted Information Using toKENs) and STIR (Secure Telephone Identity Revisited). Comcast's Chris Wendt co-chairs the work group of the Alliance for Telecommunications Industry Solutions on the SHAKEN framework for caller ID authentication, is a primary author of the STIR specifications adopted by the Internet Engineering Task Force, and leads the development team pioneering an open source implementation of the specifications to promote testbeds and interoperability lab trials in the industry. Mr. Wendt also co-chaired the Authentication Working Group of the Robocall Strike Force, which was organized in 2016 to accelerate the development and adoption of new tools for mitigating fraudulent robocalls and has provided two detailed reports on those efforts to the Commission. Moreover, Comcast's Beth Choroser co-chaired the North American Numbering Council's Call Authentication Trust Anchor Working Group, which in May 2018 prepared a report for the Commission on the governance framework and timely deployment of the SHAKEN/STIR protocol. Comcast has been and continues to be at the cutting edge of innovation and leadership on these issues, and I am pleased to provide the following updates on our implementation progress in response to your questions.

As to your first question, we are continuing to pursue an aggressive timeline for deploying call authentication capability using SHAKEN/STIR on our network. Comcast has long been engaging in active lab trials of SHAKEN/STIR with AT&T and Verizon. These coordinated lab trials are vitally important not only to provide a common testbed that facilitates collaborative efforts to identify and address particular technical issues, but also to begin laying the groundwork for ensuring interoperability of the call authentication functionalities slated to be

implemented by the participating providers. Additionally, Comcast has begun employee trials of SHAKEN/STIR on its own network; in these trials, we have turned on call-signing and other authentication functionalities for certain members of our technical team so that they can test and evaluate these capabilities in practice prior to wide-scale implementation.

Barring any unforeseen complications, we expect to have implemented the capability to sign calls originating from our residential voice customers for our entire residential subscriber base by the end of December 2018. This signing capability adheres to the relevant specifications laid out in the SHAKEN/STIR framework and is being implemented in stages, with the first set of 500,000 residential subscriber lines receiving this capability last week. We anticipate that, by the end of this year, all calls originating from Comcast residential subscribers will include headers containing SHAKEN/STIR-compliant signatures.¹

By the end of March 2019, absent any unexpected difficulties, we expect to have implemented the capability to verify calls that contain a SHAKEN/STIR-compliant signature for our entire residential subscriber base. Accordingly, by that time, all calls originating from a Comcast residential subscriber and terminating with a Comcast residential subscriber will be able to be signed and verified in accordance with the SHAKEN/STIR framework. Moreover, Comcast's implementation of signing and verification capabilities by that time will enable the company to begin interoperating with other voice providers that have implemented such capabilities. Prior to officially establishing end-to-end call authentication with another voice provider, Comcast and the other voice provider will need to complete testing to ensure compatibility; while other providers have not yet settled on firm dates by which they will complete testing with Comcast, we are committed to doing all we can to move that process along with cooperating providers expeditiously.²

Additionally, Comcast is taking concrete steps to implement call authentication capabilities for calls carried on Comcast's network on behalf of other providers. Comcast has arrangements with certain other providers enabling those providers to use Comcast's platform and telephone numbers allocated to Comcast to provide voice services to their subscribers. For

¹ As noted below, the exchange of call authentication information with other voice providers requires the completion of coordinated testing to ensure compatibility; as a result, during this initial phase preceding interoperability with other providers, Comcast will remove these headers for any calls bound for non-Comcast numbers.

² Because nearly all of the complaints Comcast receives regarding illegal spoofed robocalls are from our residential subscribers, we have prioritized implementation of SHAKEN/STIR for those customers. Comcast hopes to begin implementation for small business customers by the end of 2019 or the first half of 2020, followed by implementation for enterprise customers thereafter. Xfinity Mobile is a mobile virtual network operator (MVNO) offering provided over Verizon's cellular network and is therefore reliant on Verizon's own implementation of SHAKEN/STIR.

relevant calls originating from those providers' residential subscribers, Comcast plans to implement the signing aspect of SHAKEN/STIR by the end of the second quarter of 2019, with verification capabilities to be implemented soon thereafter. Comcast also is actively exploring implementation of call authentication capabilities in connection with its wholesale voice transit and termination offerings. One particularly promising method by which wholesale providers may be able to sign calls on behalf of their carrier customers in the future is the Telephone Number Proof of Possession (TN-PoP) protocol—which is the subject of an ongoing and active standards-setting process led by Comcast personnel.

In response to your second question, Comcast plans to take a balanced approach in displaying information regarding call authentication information on end-user devices. We are sensitive to the fact that, while our customers generally will appreciate receiving information on their displays as to whether a particular call is signed and verified, some may be overwhelmed and confused by the appearance of additional labels indicating, for instance, that a call is improperly signed or unsigned. This will be particularly true in the period prior to widespread implementation of SHAKEN/STIR, when the vast majority of calls will lack a signature. Thus, as an initial step, Comcast plans to begin displaying a checkmark or other indicator on end-user devices whenever a call is signed and verified pursuant to SHAKEN/STIR, and expects to have the technical capability to do so by no later than the third quarter of 2019. This approach comports with the written specifications for SHAKEN/STIR, which focus on the display of “positive” information that the call is signed and verified, rather than “negative” information that a call is improperly signed or unsigned.³ Particularly once SHAKEN/STIR is widely deployed, such labeling will give Comcast's customers significant protection against illegal spoofed robocalls. Comcast also continues to support the adoption of a rule expressly authorizing voice providers to block calls where the originating and terminating providers have both implemented SHAKEN/STIR for the type of call at issue and yet where authentication fails—as such a rule would help prevent illegal spoofed robocalls from even ringing on end-user devices.

Apart from pioneering the development and implementation of SHAKEN/STIR, Comcast is leading the industry's fight against illegal spoofed robocalls in various other ways. For example, Comcast is a member of the Industry Traceback Group, whose coordinated efforts to trace fraudulent calls to their source often results in a decision to add a particular number to the industry Do-Not-Originate (DNO) list. Comcast also has begun implementing specific robocall mitigation techniques authorized by the Commission's 2017 *Robocall Blocking Order*. We have already configured edge devices on our voice network to implement blocking of calls from numbers on the industry DNO list, and we block thousands of fraudulent robocalls through this method each month. Moreover, in the near future, we plan to begin deployment of a centralized capability for blocking calls appearing to originate from certain invalid and unallocated numbers.

³ Comcast also will continue to make third-party analytics tools (such as Nomorobo) available to customers who want more control over the display and treatment of inbound calls.

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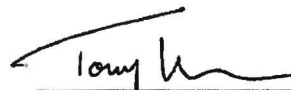
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By implementing such call blocking in a centralized fashion, we not only can block a significantly greater volume of fraudulent robocalls, but also can move swiftly to add or remove numbers or ranges of numbers to be blocked as the need arises.

We also empower Comcast customers by offering free Nomorobo compatibility with our residential voice product and by providing an easily accessible webpage instructing customers on how to activate the service. Nomorobo, which was featured at the Commission's expo on robocall mitigation technologies in April 2018, is a third-party cloud-based service that can be configured by consumers to block various types of robocalls. We estimate that this service successfully blocks roughly 10 million fraudulent robocalls bound for Comcast customers every month.

As reflected in the efforts described above, Comcast is fully committed to putting an end to the menace of illegal spoofed robocalls. We deeply appreciate your attentive and thoughtful leadership on this important issue, as well as the Commission's appropriate and meaningful enforcement actions in this area, and we look forward to continuing our close work with the Commission in stopping these abusive practices once and for all.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Tony Werner", is written over a horizontal line.

Tony Werner
President of Technology and Product
Comcast Cable

cc: Brian Roberts, Chairman and CEO, Comcast Corporation
Deborah Salons (via email at Deborah.Salons@fcc.gov)